PROPULSION SYSTEM

This application claims priority of Provisional Patent Application No. 60/413,480 filed September 26, 2002

TECHNICAL FIELD

The invention pertains to propulsion systems in general, and more particularly to a propulsion system for moving objects through space.

BACKGROUND ART

Airplanes, spacecraft and motorized boats all expel material away from themselves in order to travel forward. In the case of a boat, water is expelled backwards, and in the case of a plane, air is pushed backwards. This is also true of spacecraft and satellites that travel outside the atmosphere when they change orbit or orientation. The major limitation is that spacecraft can only carry a limited amount of fuel with which to accelerate or change direction. This invention addresses this problem. No material is expelled in the opposite direction of travel of the system. A source of power is required to operate this new propulsion system. Newton is piecemeal conserved but discontinuities occur when the system is redefined periodically by engaging other parts or masses of the system as the system operates.
The proper conditions can be produced by the system to move a vehicle forward or backward in space, water, or on the ground without expelling any matter to the outside. The system has been reduced to practice as described infra and additionally has been extensively tested on an air table for proper operation.

A search of the prior art did not disclose any patents that read directly on the claims of the instant invention. This patent is an improvement or major modification of US Patent 5,966,986 issued on 19 October 1999 to the present inventor.

DISCLOSURE OF THE INVENTION

The system is based on the principle that an equal and opposite force is produced when an unbalanced weight is rotated. This force or motion causes the system to rotate about its center of mass and thus traverse a circular path in space. Two such weights are mounted on a carriage plate and are rotated in synchrony in opposite directions by two drive motors in order to cancel lateral forces. The carriage plate that carries the counter-rotating weights is mounted on a linear slide, so when the weights rotate, the carriage plate moves back and forth on the slide. The distance that this carriage moves on the linear slide is determined by the ratio of the weight of the weights to the weight of the slide, and the length of the coupling arms of the weights. This mechanism it will only reciprocate back and forth on the linear slide as the weights rotate, it is not yet a propulsion system. In order for this mechanism to perform as a propulsion system, the reciprocating motion of the carriage on the slide has to be selectively timed and coupled to the base of the unit that the slide is mounted on. The slide is mounted on the base and this base can also be the vehicle that is moved forward. In order to move forward, the base requires an additional element or device that periodically couples the motion of the carriage to the base and thus moves the base. The device that is used to accomplish this is an electric solenoid, which is mounted to the base. When the solenoid is activated the solenoid plunger engages the slide during a pre-determined point on its travel on the slide and thus couples the slide solidly to the base. Since the slide is in motion this motion is coupled to the base. The coupling and uncoupling points and timing are crucial to the proper operation of this device .The system starts out with zero momentum or no motion forward. After one complete cycle the propulsion system has moved forward some amount, for example one inch. The base is again stopped with no forward momentum. Then the weights are again in their initial position and are ready to repeat the cycle. The base of this system is again stopped with zero forward momentum.

The weights continue to rotate and the carriage continues its back and forth motion on the slide. This is true of the first mode of operation. In the second mode of operation an increment of velocity is added to the device that the propulsion system is mounted on during each cycle. Let us examine the operation of the basic motive mechanism. One complete cycle of the mode 1 operation consists of one complete rotation of the weights. Figure 10 is the actual representation of the paths of the weights. The power or forward cycle begins at 90+/-40 degrees and ends at 180+/-20 degrees. The power cycle may start earlier, depending on the velocity of the weights and their kinetic energy in relation to the kinetic energy of the slide. During this time the carriage is locked to the base, so if the weight goes forward the carriage and base move in the opposite direction .Since the carriage and base are locked together they constitute one mass. The weights constitute the other mass. The equal and opposite momentum of these two masses cancel at 180 degrees and the base stops in space. The weights however continue to rotate. The carriage and weights are now only acting against each other, so the motion of each is proportional to the other. There is a non- symmetric condition created when the solenoid combines the weights of the base and the carriage. Symmetric rotation is no longer true. The weights have constant rotary motion in relation to the carriage and certain inertia. The carriage however must stop, since it is traveling back and forth. Notice the distance that the carriage has traveled while the weight traveled from 180 degrees to 270 degrees. This distance traveled by the carriage from 270 to 360 degree travel by the weights is close or the same as in the previous segment of travel from 180 to 270 degrees. At 270 degrees the carriage is at its most rearward travel and must reverse direction. This means that the carriage at that point has no momentum. The weights are at 360 degrees and were constrained to proportional travel during the previous segments. At 360 degrees the weight is acting against the carriage (at 360 degrees the carriage is stopped) that now has no kinetic energy. This enables the weights, due to their forward momentum, to take a more tangential path to their normal orbital path. In other words, the weights are able to drag the carriage along due to their kinetic energy and momentum. Notice that the distance that the carriage traveled from 360 degrees back to 90 degrees is twice that of the previous segment. This

disproportionate travel of the carriage from 360 to 90 degrees enables the propulsion system to reset itself to initial conditions and repeat the next cycle.

The second mode of operation (this mode enables the system to accelerate additively each time it is engaged) also takes advantage of this new non-symmetric behavior. Notice that the carriage and the weights, during part of the rotation segment from 360 to 90 degrees, are traveling in the same forward direction. If you have two coupled masses simultaneously traveling in the same direction you can couple some of this kinetic energy to a third outside body. There are several ways that this can be accomplished using this propulsion system. During the segment that the carriage and weights are traveling in the same direction you can couple some of this energy directly to a third body by attaching a coupling mechanism to the slide that can be engaged to the third body and thus accelerate the third body. Another method to accomplish the mode 2 operation is to couple the slide to the base and also couple the base to the body to be accelerated. The degree of coupling to the third body can be varied. The engagement of the second mode of operation may cause the carriage and the weights to change their position in relation to the base. The consequence is that you run out of slide. In other words, the carriage and weights are on the rear position of the slide. This action may require engaging the mode one operation and or repositioning the carriage and weight assembly by a servo mechanism that re-synchronizes the parts to their proper position in relation to the base, and their position on the third body that is being accelerated and is now in motion.

One complete cycle of the mode 1 operation consists of one complete rotation; of the weights. The propulsion unit only moves forward during 90 degrees of rotation, the other 270 degrees of rotation are used to reset the system back to initial conditions. Figure 10 is the actual representation of the paths of the weights in reference to the base. The power or forward cycle begins at 90 degrees and ends at 180 degrees. During this time the carriage is locked to the base, so if the weights go forward and the carriage and base move in the opposite direction, since the carriage and base are locked together they constitute one mass. The weights constitute the other mass. The equal and opposite momentum of these two masses cancel at 180 degrees and the base stops in space. The carriage is uncoupled from the

base at this point. The weights however continue to rotate. The carriage and weights are now only acting against each other, so the motion of each is proportional to the other.

There is a non-symmetric condition created when the solenoid combines the weights of the base and the carriage because the ratio of the interacting masses has changed and also the center of mass, since the masses interacting are now different. The weights have a constant rotary motion, so the weights have a certain fixed inertia. The carriage however must stop momentarily at 180 and 360 degrees since it is traveling back and forth, therefore the carriage has variable inertia. Notice the distance that the carriage has traveled while the weight traveled from 180 degrees to 270 degrees. This distance traveled by the carriage from 270 to 360 degree travel by the weights is close or the same as in the previous segment of travel from 180 to 270 degrees. At 270 degrees the carriage is at its most rearward travel and must reverse direction. This means that the carriage at that point has no momentum. The weights are at 360 degrees and were constrained to proportional travel during the previous segments. At 360 degrees the weights are acting against the carriage that now has no kinetic energy. This frees or enables the weights to take a more tangential path to their normal orbital paths. In other words, the weights are able to drag the carriage along due to their kinetic energy and momentum. Notice that the distance that the carriage traveled from 360 degrees back to 90 degrees is twice that of the previous segment.

This mechanism enables the propulsion system to reset itself to initial conditions and repeat the next cycle. If the speed of rotation of the weights is increased the kinetic energy of the weights is also increased. This enables the carriage to reach its initial condition before the weights have reach 90 degrees. This makes it possible to increase the size of the power cycle.

The second mode of operation also takes advantage of this new behavior. Notice that the carriage and the weights, during part of the rotation segment from 360 to 90 degrees, are traveling in the same forward direction. If you have two coupled masses simultaneously traveling in the same direction you can couple some of this kinetic energy to a third outside body. This energy coupling to a third body makes the mode 2 operation possible. The mode 2 operation enables this energy a accelerate the third body, which could be a spacecraft. By

proper timing of the coupling to the third body this body can be accelerated an additional increment each time that this is done. These increases in acceleration are additive. Another method of coupling the energy or momentum to a third body is to couple the forward momentum of the slide and weights to the base. This can be done by capturing and braking their momentum by a solenoid or other device that is coupled to the base. This coupling means transfers the momentum of the weights and the slide into forward momentum of the base.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a side elevational view of the propulsion system mounted within a payload platform.

FIGURE 2 is aside elevational view of the propulsion unit.

FIGURE 3 is a top plan view of Fig. 2.

FIGURE 4 is an elevational end view of Fig. 2.

FIGURE 5 is an end view of a magnetically levitating constraining assembly.

FIGURE 6 is a block diagram of a rechargeable battery.

FIGURE 7. Is a block diagram of a nuclear battery.

FIGURE 8 is a block diagram of a plurality of photovoltaic cells.

FIGURE 9 is a schematic diagram of an internal combustion engine.

FIGURE 10 is the picture of the weight travel in the mode 1 operation.

FIGURE 11 is a side elevational view.

FIGURE 12 is a top plan view of Fig. 11.

FIGURE 13 is an end view of Fig. 11

FIGURE 14 is a schematic diagram of a weight driving means mounted to the base with a flexible shaft.

FIGURE 15 is a schematic diagram showing the propulsion system with a means for reversing the systems direction of travel.

FIGURE 16 is a side elevational view of the propulsion unit mounted on a second carriage constraining means that allows the propulsion unit to operate in the mode 2.

FIGURE 17 is a view of the weight path in the mode 2 operation.

BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention is presented in terms of a preferred embodiment which is described in two operational modes: a mode 1 and a mode 2. In each of these modes the propulsion unit controls the attitude and or propulsion of a payload platform. The preferred embodiment, as shown in FIGURES 1-17, is comprised of two major elements: a propulsion unit 12 and a payload platform 90, as shown in FIGURE 1. The propulsion unit 12 is further comprised of the following major elements: a base 14, a carriage constraining assembly 20, a carriage 30, a pair of counterbalanced weights 42, a motor 40 and a power source 46. The base 14, as shown in FIGURES 2, 3 and 4, consists of an upper surface 16 and a lower surface 18. The lower surface 18 of the base 14 is designed to be rigidly attached to the payload platform 90. The carriage constraining assembly 20 includes an upper movable section 22 and a lower stationary section 24. The lower stationary section 24 is rigidly attached to the upper surface 16 of the base 14, as also shown in FIGURES 2, 3 and 4. The carriage constraining assembly 20 can consist of a linear slide assembly 28, as shown in FIGURES 2, 3 and 4, or a magnetically levitating constraining assembly 21, as shown in FIGURE 5. The linear slide assembly 28 also includes an upper movable section 22 and a lower stationary section 24.

The upper movable section 22 of the carriage constraining assembly 20 is attached to the lower surface 32 of the carriage 30. The carriage 30 also has an upper surface 34, a front end 36 and a rear end 38. Attached by an attachment means to the upper surface34 of the carriage 30 are the two counterbalanced weights 42, as shown in FIGURES 2, 3 and 4. These weights are made of a high-density material having a specific gravity of at least 0.5Gm/Cm3. The weights are rotated in synchrony, either in a clockwise or counterclockwise direction by at least one electric motor 40. As shown in FIGURES 2, 3 and 4, attached to the base 14 are two stops 64 and 84 which may also contain a shock damping means.

In one design configuration, the means for attaching at least two of the counterbalanced weights 42 to the gears 94 and then to the upper surface 34 of the carriage 30 is accomplished, as shown in FIGURES 2, 3 and 4, by attaching the motor 40 and a second motor 44 to the upper surface 34 of the carriage 30. Gears 94 keep the weights in a proper relationship to each other. The two motors 40 and 44 are synchronized to rotate in opposite directions which allow the pair of weights 42 to maintain a relationship which cancels their lateral forces.

In whichever design configuration is utilized the motors 40 and 44 are operated by a power source 46. This power source may consist of a rechargeable battery 48 as shown in FIGURE 6, a nuclear battery 50, as shown in FIGURE 7; an array of photovoltaic cells 52, as shown in FIGURE 8; or a combination of the above power sources or a fuel burning combustion engine 54 as shown in FIGURE 9. The motor 40 can also be mounted on the base 14 and a flexible or movable shaft can couple energy to the weights 42 via gears 94, as shown in FIGURE 14. The propulsion unit, as shown in Figure 20 can be rotated on the payload platform 90, as shown in Figure 15 to reverse the direction of travel of the payload platform.

The second major element of the propulsion system, as shown in Figures 1, 15 and 16, is the payload platform 90 that can consist of any vehicle to be propelled. As previously stated, the propulsion system can be designed to operate in either a mode 1 or a mode 2 operating cycle or a combination of both.

FIGURE 12 will be used to explain the operation of the mode 1 operation. Remember that the forward or power cycle of the mode 1 operation is from 90-180 degrees, and the rest of the rotation of the weights are the reset to initial conditions, as shown in FIGURES 10 and 17. The mode 1 weight paths, are shown in FIGURE 10, and in conjunction with FIGURE 12, explain the operating sequence of mode 1. The weights 42 are shown in Fig. 12 to be about the 235 degree position. Weights are at the 90 degree position on FIGURE 12. The weights are shown in the 90 degree position in

FIGURE 10. FIGURE 3 shows an encoder 72 that determines the position of the weights 42 in relation to the carriage 30.

The base 14 is stopped in space, the carriage 30 is not moving, the motors 40 and 44 are off, and the solenoid 80 is not engaged. The power source 46 is turned on, which causes the motors 40 and 44 to begin rotating. This rotation causes the weights 42 to turn in the direction indicated by the arrows. The solenoid 80 also engages and couples the carriage 30 to the base 14 because the encoder 72 sensed the position of the weights 42 at 90 degrees. The rotation of the weights 42 from 90 degrees towards 180 degrees causes the now coupled base 14 and the carriage 30 to travel in the opposite direction. As the weights 42, and base 12 along with the carriage 30 travel in opposite directions they both slow their respective velocities in relation to the back and forth motion of the slide 28. At 180 degrees, as shown in FIGURES 3 and 10, the momentum of the weights going backwards is canceled by the momentum of the carriage 30 and base 14 going in the opposite direction. This causes the base 14 to stop in space with no further forward momentum. The position sensor 72 de-energizes the solenoid 80 and thus decouples the carriage 30 from the base 14. The weights 42 however continue to rotate. At 180 degrees the carriage 30 reverses direction on the slide 28 and the carriage now travels backwards as the weights 42 travel forward.

FIGURE 10 illustrates path the of the weights 42 in relation to the base 14. It is crucial to understand the reset cycle of the propulsion system because this clarifies the reason that the propulsion unit operates contrary to popular belief. If you let the weights 42 rotate freely on the carriage without engaging the solenoid you get an oval symmetric pattern, as shown in FIGURE 10a. This pattern is symmetric and the center of mass is conserved for all segments of rotation. When this symmetry is disturbed, for example by engaging the solenoid and thus changing interacting masses, the symmetry of the rotating weight path is changed.

As shown in FIGURE 10, at 180 degrees the weights 42 begin their backwards travel. Notice that the amount of travel of the carriage is not equal for the equal rotation of the weights 42 for all four segments shown. From 90-180 degrees the carriage 30 is

locked to the base 14. There is no motion of the carriage30 in relation to the base 14 because they are locked together by the solenoid 80. This is the forward or power segment of operation of mode 1.

As the weights travel from 180 to 270 degrees, note that the carriage motion is similar to when the weights travel from 270-360 degrees. When the weights are at 360 degrees the carriage 30 is at its most rearward position. At this position the carriage 30 must reverse direction and stop momentarily. This action reduces the kinetic energy of the carriage to zero. The weights however are rotating with same kinetic energy. The momentary change of mass or kinetic energy permits the weights to travel or escape to a more tangential path to their normal path. In other words, the kinetic energy of the weights is now able to drag the carriage 30 a greater distance than normal for that segment of operation (360-90 deg.). Notice that the carriage 30 has traveled twice the distance forward in just 90 degrees of rotation. This fact enables the propulsion system to reset itself to initial conditions and keep repeating the forward motion of the whole system as long as power is supplied. The speed of the motors 44 and 40 can be varied to change the velocity of motion of the system 90. It has proved sometimes advantageous to slow the motor speed as the weights 42 approach the 90 degree point in order to reduce the coupling shock of the carriage 30 as it locks to the base 14 when solenoid 80 engages.

If the reference position of the carriage 30 is lost in relation to the base 14 due to friction or misalignment over time a servo mechanism 56, as shown on FIGURE 2, re-positions the carriage 30 on the slide base 20 so the unit will not run into the stops 64 or 84 The mode 2 operation can be best understood with the help of FIGURES 3, 10,12 and 17. There are several different methods to operate the propulsion system 12 in the second mode .The second mode of operation utilizes all of the operations of mode 1.The mode 2 operating system enables a payload platform, as shown in FIGURE 15, to be accelerated an increment of velocity during each cycle in which the mode 2 components of the system are engaged. These incremental acceleration steps are additive and thus the payload platform 90 can reach great velocities. FIGURE 15 shows

a means 96 to rotate or reverse the action of the propulsion system on the payload platform 90.

Another method of accelerating the payload platform 90 is possible. During part of the rotational cycle the weights 42 and the carriage 30 travel in the same direction from 360 degrees to approximately 45 degrees of the rotation of the weights 42, as shown in FIGURE 10. Notice the disproportionate travel of the carriage while the weights 42 rotate from about 360 degrees to 90 degrees, as shown in FIGURES 10 and 17. During the portion of this travel, as shown in FIGURE 4, a weight grabbing means 26 is activated by a stopping means solenoid 25. The proper timing for this action is determined by a weight position sensor 73. This action couples the slide 30 and the weights to the base 14. The momentum of the carriage 30 and the weights 42 are thus transferred to the base 14 and accelerate the base. The base can be coupled to the payload platform during this time by a solenoid 104 that is fixed to the payload 90, thus resulting in the acceleration of the payload platform 90.

FIGURE 16 shows the propulsion system 12 mounted on a upper movable slide 102 that is part of the linear slide 98. The lower portion of the constraining assembly 100 is mounted to the payload platform 90. The solenoid 104 enables the propulsion system 12 to be directly coupled to the platform 90. End stops with dampers 106 and 108 are utilized to keep the upper movable slide 102 confined. A servo mechanism 60 keeps the propulsion system 12 positioned on the lower stationary section 100 if the reference position of the propulsion system 12 is lost to the payload platform 90.

While the invention has been described in complete detail and pictorially shown in the accompanying drawings it is not to be limited to such details, since many changes and modifications may be made to the invention without departing from the spirit and the scope thereof. Hence, it is described to cover any and all modifications and forms which may come within the language and scope of the claims.